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Research Article

Investment Incentives in Türkiye: Macroeconomic Analysis with Geographically Weighted Regression[a,b]

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One of the most important objectives of investment incentive policies implemented in Türkiye is to reduce regional development level disparities. In this context, 81 provinces were classified into six regions, and region-specific investment incentives with different scopes and budgets have been implemented. The effectiveness and contributions of investment incentives to the region are essential in economies such as Türkiye, where regional imbalances are evident. In this study, investment incentives implemented in Türkiye are examined from a macroeconomic perspective to determine their economic effects using the geographical (spatial) analysis method. The results show that the relationship between investments, employment, the number of incentive applications, and exports within the scope of incentives and province-level national income is more substantial in particular provinces. Our analysis indicates that increasing the effectiveness of incentives requires developing institutions to continuously and dynamically evaluate and monitor the impacts of these policies.

JEL codes: O10, O20, C010

Keywords: Investment Incentive System, Turkish economy, GWR method

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1 Introduction

Regardless of the level of development, countries apply incentive policies with different qualities to develop their industries, ensure balanced regional development and support sectoral developments. Ensuring balanced development in economies, which have become more interdependent and easily affected by each other due to globalization, requires implementing flexible, multi-purpose and multi-instrument incentive systems (Akan & Arslan, 2008, p. 109). The primary objective of incentives is to support firms directly or indirectly and to create employment by increasing the volume of investment and production. In doing so, it is very important to determine and implement incentives very carefully in terms of quality and quantity. Otherwise, rationality in resource allocation may be negatively affected.

Although incentive policies are considered to have only economic objectives, they also have important objectives regarding the development of society and increasing the level of welfare. As a fiscal policy instrument, incentives play a vital role by increasing income and expanding the tax base through creating investment and employment. Incentives are also essential in preventing domestic migration, especially from rural to urban areas, by reducing inter-regional development disparities.

Incentives have different objectives depending on the economic policies targeted by countries and their level of development. Developed countries resort to incentive measures to maintain competitiveness, sustain technological development, prevent capital outflow, support sectors that need to be incentivized and increase employment. On the other hand, in developing countries, incentives are applied to ensure economic development and industrialization, develop backward regions, eliminate regional imbalances, gain international competitiveness, expand employment opportunities, increase exports and foreign direct investment (FDI) inflows (Gürler Hazman & Karakuş Büyükben, 2020, p. 189). Investment incentives have the effect of improving the current account deficit and reducing foreign dependency by supporting the production activities of domestic firms. They also have important functions such as regulating and protecting employment and supporting new investments by stimulating factors of production and resources for underdeveloped regions (Öğüt & Barbaros, 2003, p. 12). Incentives can be effective at different stages of a firm's or industry's production, development and adaptation to the market, starting from the establishment stage. In this respect, the scope of incentives regarding which factors of production and sectors can benefit for how long is very important in terms of their efficiency (Gülmez & Noyan Yalman, 2010, p. 237). In particular, regional incentive policies have social consequences, such as preventing migration and improving the socio-economic structure of the region by reducing inter-regional development disparities in addition to their economic impacts.

Incentives can be in-kind, such as land-terrain allocation and building provision, or financial, such as grants, premiums and credits provided under convenient conditions. Guarantees and sureties supplied within the scope of incentives, on the other hand, are applied in the form of publicly funded risk capital participation in risky projects and privileged public insurance covering economic and commercial risks (Ay, 2005, p. 179). Tax incentives are implemented in direct (reduced corporate tax) or indirect (export incentives and free zone practices) manners. In addition to low corporate tax, tax holidays, tax havens, and investment allowances are also considered direct tax incentives (Öz, 2019, p. 67). Other incentives include the provision of energy at a lower price, pre-investment services, financing sources, investment project preparation and management, market research, raw materials and in-

frastructure, production process and marketing techniques, training, know-how or quality control development techniques, and privileged public agreements (Ay, 2005, p. 179).

Incentive schemes in Türkiye have complementary or supportive features to development programmes. The issue of eliminating regional inequalities and efficient use of existing resources has maintained its importance in almost every development programme implemented from the foundation of the Republic. Various activities have been encouraged to accelerate economic development according to the characteristics and needs of the period. The scopes of incentives that have been implemented have often been revised by various laws (Akdeve & Karagöl, 2013, p. 336). In the early 2000s, the need for changes in the incentive system emerged as a complement to industrial policies. Changes in the incentive system were made in 2004 with the regulations of Law No. 5084, followed by revisions in 2006 and another incentive package in 2009. The "New Incentive System", effective from 2012 with the Decree of the Council of Ministers dated 15.06.2012 and numbered 2012/3305, is one of the incentive systems with a very broad scope. This system was prepared in line with the development level of the regions, and the unique characteristics and potential of the provinces were taken into consideration (Yılmaz, 2020, p. 439). In this context, the incentive system consists of four different applications (Telbaş & Yalçınkaya, 2022, p. 5):

1) General Incentive Practices: It is aimed to reduce the development differences between cities and increase their production and export capacities.
2) Regional Incentive Practices: It is aimed to support the pre-determined investment issues within the scope of 5th region incentives.
3) Incentives for Priority Investments: Investments with high added value that will reduce the current account deficit are supported.
4) Incentives for Strategic Investments: All other investment issues not covered by incentives are under this topic.

The incentive system has been revised periodically since 2012 to improve it, especially in the fields of industry, energy, and technology. In late 2016, additional measures such as the "Attraction Centers Program" were added to these arrangements (Yılmaz, 2020, p. 439). The aim of the program is to increase the production, export, employment, productivity, technology and innovation capacities of cities that have the characteristics of regional centers of attraction in relatively underdeveloped and migratory regions to ensure a more balanced settlement pattern throughout the country and to redirect migration gradually. Incentive programs aim to increase the quality of production in the domestic market on a sectoral basis to produce high-value-added products, thus ensuring consistency in competitiveness in foreign markets and attracting foreign investments to the country.

This study utilizes the spatial statistical analysis method to investigate the effectiveness of investment incentives. In addition to the classification criteria used in the distinction of incentivised regions, the study aims to explore the existence of spatial effects. The Geographically Weighted Regression (GWR) method determines the economic effects of investment incentives between 2004 and 2019 for 81 provinces. The results reveal that the economic effectiveness of incentives measured by province-level per capita national income varies according to the province. According to the results, the provinces with the highest relationship between investments within the scope of incentives and province-level national income were the provinces in the central part geographically. The employment provided within the scope of incentives affected the province-level national income the highest in

Antalya, Konya, Ankara, Bolu, Karabük and Bartın. In the eastern provinces, contrary to expectations, employment creation had no impact on province-level income. The provinces with the highest relationship between incentive applications and income were the eastern provinces. Ankara was the only province with a statistically significant impact of exports on income. These results highlight the necessity of considering spatial effects for incentive planning activities, and our study fills a gap in the literature by quantifying these impacts. In this context, it has been determined that the incentives to be introduced to reduce regional development disparities should be determined by considering geographical effects.

The rest of the study is planned as follows. Section 2 discusses the literature on investment incentives. Section 3 explains the GWR methodology, and Section 4 gives the empirical outcomes. Section 5 evaluates the study results and provides policy recommendations.

2 Literature

Various studies have been conducted to determine the effectiveness of investment incentives by applying classical least squares, causality, and cointegration analyses. However, studies that take spatial effects into account are limited.

There are studies investigating the relationship between incentives and province-level per capita national income or economic growth. Goss & Phillips (1999) investigated the relationship between incentives and economic growth in the sub-regions of the State of Nebraska in the US for the years 1987-1995 and found that incentives have a positive effect on economic growth in sub-regions with low unemployment. On the other hand, no significant relationship was found between incentives and economic growth in regions with high unemployment. González-Páramo & López (2003) analyzed the relationship between public investment and per capita income in 17 regions of Spain for the years 1965-1995 and revealed that public investments negatively impact regional economic growth Gerni et al. (2015) investigated investment incentives in NUTS-2 regions in Türkiye with convergence analysis between 2004 and 2012. The results indicate that per capita income increases lead to absolute convergence across regions. In addition, it is concluded that investment incentives do not have a positive effect on income convergence across regions. The results of Recepoğlu & Değer (2016) on the relationship between regional incentives and economic growth in NUTS-2 regions in Türkiye for the years 2004-2011 showed that investment incentives have a positive effect on regional economic growth in the long run. Causality analysis results revealed a bidirectional causality between investment incentives and growth in developed and developing regions, whereas unidirectional causality from investment incentives to growth in less developed regions. Sağdıç et al. (2021), analyzing the impact of investment incentives on growth in 26 development regions in Türkiye for the years 2004-2018, found that regional investment incentives have a positive effect on regional economic growth, and the incentives provided to the agricultural sector are more effective than other incentives.

The globalization process has led countries to benefit from various advantages by attracting FDI inflows. In this context, countries have tended to create attractive investment environments for foreign investors, and there are studies investigating the relationship between incentives and FDI. Tung & Cho (2001) showed that the tax incentives in China applied between 1988 and 1994 attracted higher FDI flows into regions with low tax rates. The results also revealed that infrastructure variables are important determinants of regional investment decisions. The analysis of Şaşmaz & Bayar (2017) on Türkiye for quarterly data

from 2006 to 2016 showed that fiscal incentives have a positive effect on FDI inflows in the long run. Using quarterly data for the 2001-2021 period, Sevinç & Şeker (2023) also confirmed the same long-run relationship, in addition to unidirectional causality from exports to investment incentives in the short run and unidirectional causality from investment incentives to FDI in the medium and long run.

One of the positive effects expected from incentive investments is the increase in employment capacity with new investments. Akan & Arslan (2008) investigated the relationship between investment incentives and employment in Türkiye from a regional perspective from 1980-2006. The results reveal a direct relationship between incentives and employment in the Eastern Anatolia Region. Öz & Buyrukoğlu (2017) investigated the macroeconomic effects of investment incentives in Türkiye for the years 1980-2012. According to the analysis results, a positive effect was found between investment incentives and growth and employment provided within the scope of incentives. In addition, there is a very short-run positive effect between investment incentives and foreign direct investments.

As a result of increased economic activities through incentives, exports are expected to increase. Some studies conducted in this context have investigated the relationship between incentives and exports. Madani & Mas-Guix (2011) investigated the impact of tax incentives and automotive export performance in South Africa from 1996-2006. The results of the analysis reveal that tax incentives positively affect automotive exports. İlkhan et al. (2022) investigated the relationship between investment incentives and economic growth and exports in 6 investment incentive regions in Türkiye from 2004-2018. The results of the analysis reveal that investment incentives have different regional effects. While investment incentives are significantly related to growth and exports in regions with developed industries, no significant relationship was found in regions with underdeveloped industries. Recepoğlu et al. (2022) investigated the relationship between investment incentives, public investment expenditures and exports at the provincial level from 2002-2017 in Türkiye. The results of the analysis reveal that there is a bidirectional causality relationship between investment incentives and exports. In addition, a unidirectional causal relation from exports to public investments was found.

One of the studies investigating the effectiveness of fiscal and tax incentives on industrial investments in Iran from a sectoral perspective belongs to Mahdavikia & Tanrıöven (2022). The results revealed that the effects of tax credits and investments in different industry sectors are in the same direction. He stated that production costs, interest and inflation rates negatively affect investments in various industries.

One of the limited literature examples that considers spatial characteristics belongs to Yavan (2012). In this study, the determinants of investment incentives in 81 provinces in Türkiye were investigated spatially from 2001-2008. The results reveal that income, industrial investments, openness to foreign trade, political power, ideology of the ruling party and having the status of priority region for development are the determinants of the incentives received by provinces. In addition, it is concluded that the level of unemployment in a province and openness to foreign trade are ineffective in the distribution of incentives.

There is a lack of studies in the literature on incentives that take into account spatial effects. Compared to previous studies based on classical least squares regressions, studies considering geographic information seem to have stronger aspects. Not all regions of countries are spatially homogeneous and tend to be affected by spatial factors. Regional data exhibit phenomena such as non-stationarity, especially concerning neighbouring locations,

which can vary depending on location. The recent development of geographic statistical analysis allows for overcoming past methodological problems and quantifying spatial effects (Kamata et al., 2009, p. 2). It is observed that the differences at the provincial level were not sufficiently emphasized in the past studies. In this study, the GWR method, which considers the spatial effects, was applied to develop a new perspective to eliminate this deficiency in the literature. In addition, the use of the GWR method to analyze policies to reduce regional differences in the recent literature has been another motivation for the study (Sassi, 2009; Montresor et al., 2011; Wu et al., 2016; Sartika & Murniati, 2021).

3 Econometric Analysis

The GWR method is a local spatial regression method that models changing relationships over geography. In other words, it is a spatial data mining method that generates predicted values for other points with known locations and properties based on reference points with known locations and properties. Unlike the classical regression model, the coefficients are functions of spatial location; each spatial point has its coefficients (Fotheringham et al., 2002, 2017; Lu et al., 2014, 2018). Equation (1) provides the model.

$$\begin{aligned} y_i &= \beta_{i0} + \sum_{k=1}^{m} \beta_{ik}\ x_{ik} + \epsilon_i \qquad i = 1, \ldots, n \\ y_i(u_i, v_i) &= \beta_{i0}(u_i, v_i) + \sum_{k=1}^{m} \beta_{ik}(u_i, v_i)\ x_{ik}(u_i, v_i) + \epsilon_i(u_i, v_i) \end{aligned} \tag{1}$$

where (u_i, v_i) are the coordinates of point i, y_i is the dependent variable, $x_{ik},\ k = 1, \ldots, m$ is the coefficient of the independent variable and ϵ_i is the error term. The regression coefficient $\beta_{ik},\ k = 0, \ldots, m$ is shown in equation (2) (Fotheringham et al., 2002).

$$\beta_i(u_i, v_i) = \left(X^T W(u_i, v_i) X\right)^{-1}\ X^T W(u_i, v_i) Y \tag{2}$$

where X is the matrix of independent variables and consists of $m + 1$ columns, $Y = (Y_1, \ldots, Y_n)^T$ is the dependent variable matrix, and W denotes the diagonal matrix consisting of w_{ij}, the neighbourhood ratio between the regression point and the reference point, values as given in equation (3).

$$w_i = \begin{bmatrix} w_{i1} & \ldots & \ldots & 0 \\ \vdots & w_{i2} & 0 & \vdots \\ 0 & 0 & \ldots & w_{in} \end{bmatrix} \tag{3}$$

The neighbourhood ratio w_{ij} is calculated by Global Model, Box-Car, Exponential, Gaussian, Bi-Square and Tri-Cube methods. Generally, Gaussian and Bi-Square kernel functions are used. With the Gaussian kernel function, the neighbourhood ratio w_{ij} between point i and point j is calculated as in equation (4) (Gollini et al., 2013; Guo et al., 2008).

$$w_{ij} = exp\left[-\frac{1}{2}\left(\frac{d_{ij}}{bw}\right)^2\right] \tag{4}$$

where bw is the bandwidth value and d_{ij} is the distance between regression point i and reference point j. The distance d_{ij} is usually calculated as in equation (5).

$$d_{ij} = \sqrt{(x_i - x_j)^2 + (y_i - y_j)^2} \tag{5}$$

where x and y are the point coordinates. The bandwidth parameter bw can be constant for the whole GWR model, or it can be variable according to the point density in the region. Cross-validation (CV), Generalized cross-validation (GCV), Akaike Information Criterion (AIC), and Bayesian Information Criterion (BIC) methods can be used to find the optimal bw value for the dataset. It is found that the AIC method gives more accurate results (Fotheringham et al., 2002; Lu et al., 2017) and calculated as shown in equation (6).

$$AIC_c(b) = 2nl\ n(\hat{\sigma}) + nln(2\pi) + n\left\{\frac{n + tr(S)}{n - 2 - tr(S)}\right\} \tag{6}$$

where n is the number of observations, $\hat{\sigma}$ is the estimated standard deviation of the error term, $t(S)$ S is the trace of the S matrix (Lu et al., 2014).

The GWR method determines the macroeconomic effects of investment incentives for 2004-2019 for 81 provinces of Türkiye. The data are obtained from Turkish Statistical Institute (2023) and Republic of Türkiye Ministry of Industry and Technology (2023). The variables used in the model are chosen based on their use in the related literature and availability. The GWR model estimated in the analysis is given in equation (7).

$$lnkbg_i = \beta_{i0} + \beta_{i1} lntsy_i + \beta_{i2} ti_i + \beta_{i3} tb_i + \beta_{i4} lnih_i + \epsilon_i \quad i = 1, 2, \ldots, 81 \tag{7}$$

where $(lnkbg_i)$ is the level of province-level per capita national income, $(lntsy_i)$ is total investments under incentives, ti_i is the employment provided under the incentive, tb_i is the number of incentive certificates, $(lnih_i)$ is total export level, and ln indicates that natural logarithmic transformation has been applied to the relevant variable.

4 Empirical Results

Table 1 provides the range of variation of variables used in the GWR estimation. The coefficient of investment within the scope of incentives varies between -0.051 and 0.188. The coefficients of employment, incentive applications, and exports vary between [-0.588, 0.276], [-0.213, 0.655], and [-0.012, 0.058], respectively.

Table 1: The descriptive statistics of the GWR results: summary

Independent Variable	Min	25%	Median	75%	Max	Global
Intercept	8.221	8.482	9.192	10.546	10.946	9.108
lntsy	-0.051	0.056	0.085	0.129	0.188	0.249
ti	-0.588	-0.426	-0.078	0.177	0.276	-0.178
tb	-0.213	-0.146	-0.038	0.391	0.655	0.005
lnih	-0.012	0.001	0.016	0.036	0.058	0.027
AIC		-66.065		Quasi Global R2		0.819
Residual Sum of Squares		1.675		Fixed Bandwith		236.989

Table 2 shows that the GWR method is better than the panel ECM method. According to the F(1) and F(2) test statistics, the H0 hypothesis is rejected, and the H1 hypothesis

that the GWR method is superior is accepted. Accordingly, using the GWR method is 32.1% better than the panel ECM method. The F(3) test statistic expresses the level of adaptation of variables to spatial variation and confirms the validity of the GWR method: the statistically significant probability values of the coefficients indicate that spatial variation exists and that the proximity level of the provinces is effective.

Table 2: The results of Leung's F-test

	F Value	df1	df2	SS OLS residuals	SS GWR residuals	SS GWR improvement
F(1) Test	0.458 (0.00)***	64.668	76	4.890	1.675	-
F(2) Test	2.629 (0.00)***	29.479	76	4.890	-	3.214
F(3) Test	F Value	numerator or d.f.		Denominator d.f.		probability
Intercept	1.92e+08	1.49e+01		64.668		0.00***
lntsy	1.92e+07	1.84e+01		64.668		0.00***
ti	2.24e+08	1.77e+01		64.668		0.00***
tb	21.48e+08	1.83e+01		64.668		0.00***
lnih	9.35e+06	2.06e+01		64.668		0.00***
Fixed Bandwith	236.989					

Note: p<0.01 ***

Table 3 presents the global OLS results. In this regard, incentivised capital investments positively and statistically significantly affect income per capita, while employment supported by incentives is negatively significant. Incentive applications and export variables are not significantly correlated with per capita income.

Table 3: The results obtained by the global model (OLS)

Independent Variables	Coefficients	Std. Error	t value	probability
Intercept	9.108	0.292	31.091	0.00***
lntsy	0.249	0.046	5.142	0.00***
ti	-0.178	0.077	-2.313	0.023**
tb	0.005	0.103	0.055	0.956
lnih	0.027	0.023	1.142	0.256
F statistics	17.11			0.00
Adjusted R2	0.446			

Note: p<0.01 ***, p<0.05 **

According to the GWR coefficient estimates given in Table 4, the range of variation of the coefficient of investment under incentives is [-0.047, 0.164]. The range of variation of

Table 4: Summary of GWR coefficient estimates

Independent Variable	Min	1st. Quarter	Median	Third Quarter	Max
Intercept	8.140	8.314	9.187	10.619	10.741
lntsy	-0.047	0.031	0.081	0.093	0.164
ti	-0.503	-0.436	-0.058	0.212	0.296
tb	-0.192	-0.164	-0.045	0.419	0.530
lnih	-0.0051	0.0004	0.017	0.042	0.056
AIC		-58.674	Adjusted R2		0.733
Residual Sum of Squares		1.931			

Note: Euclidean distance metric is used. The Kernel function, bi-square is selected.

the coefficient of employment provided under incentives is [-0.503,0.296], the range of variation of the coefficient of incentive applications is [-0.192, 0.419], and the range of variation of the coefficient of exports is [-0.051, 0.056].

Figure 1 shows the explanatory power of the model, i.e., the R^2 value for each province. In this respect, the model explains 82% of the variation in the dependent variable, the level of province-level per capita national income, in Thrace and Hakkari. Towards inland regions, the R^2 value drops to 75%. These results indicate that the explanatory power of the model is high.

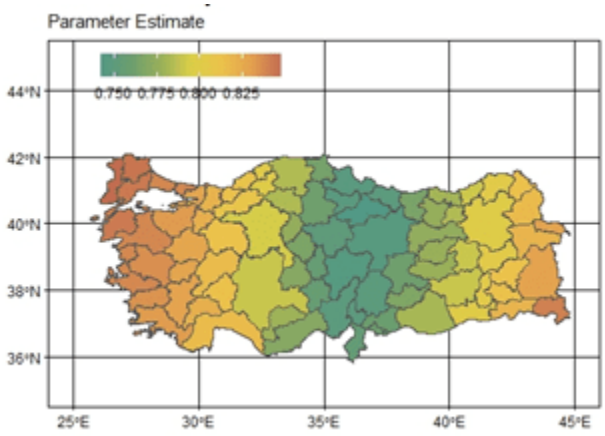

Figure 1: Local R2 in Türkiye

Figures 2-5 show the province-level geographical distribution of the coefficients on the map, where the subfigure on the left-hand side displays the coefficients, and the subfigure on the right-hand side shows the significance (green colored) of the variable for the province.

Figure 2 indicates that the coefficient of capital investments made within the scope of incentives is significant in the central part of Türkiye, including the provinces of Sinop, Samsun, Ordu, Giresun, Trabzon, Çorum, Amasya, Tokat, Sivas, Yozgat, Nevşehir, Kayseri, Kahramanmaraş, Malatya, Elazığ, Niğde, Adana, Osmaniye, Hatay, Kilis, Gaziantep, Mardin and Diyarbakır. The provinces with the highest correlation between incentive invest-

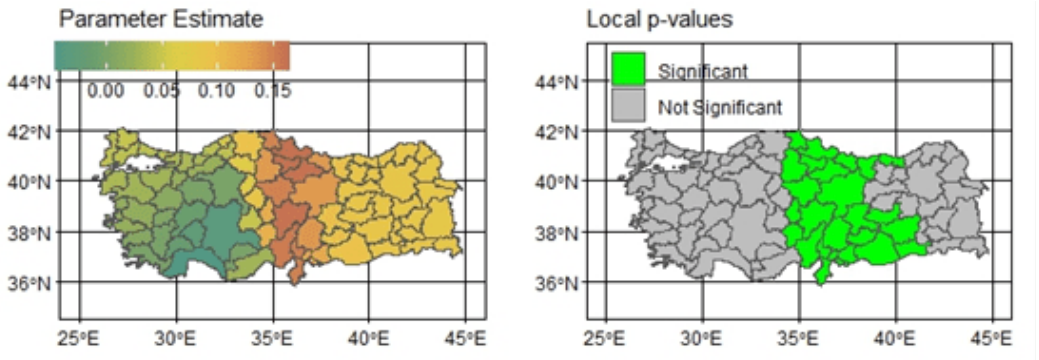

Figure 2: Investments Provided within the Scope of Incentives in Türkiye

ments and province-level per capita national income are Samsun, Amasya, Tokat, Kayseri, Adana, Osmaniye and Hatay. In these provinces, a 1% increase in incentive investments leads to a 0.15% increase in per capita income. On the other hand, a 1% increase in incentive investments in the western and eastern provinces leads to a 0.05% and 0.10% increase in income per capita, respectively.

Figure 3 shows the relationship between the employment provided within the scope of incentives and per capita income at the provincial level. The provinces where the coefficient is not significant are Kastamonu, Sinop, Çankırı, Çorum, Kırıkkale, Yozgat, Kırşehir, Nevşehir, Aksaray, Niğde and Mersin. The coefficient is significant in all other provinces. In Antalya, Konya, Ankara, Bolu, Karabük and Bartın provinces, a 1% increase in employ-

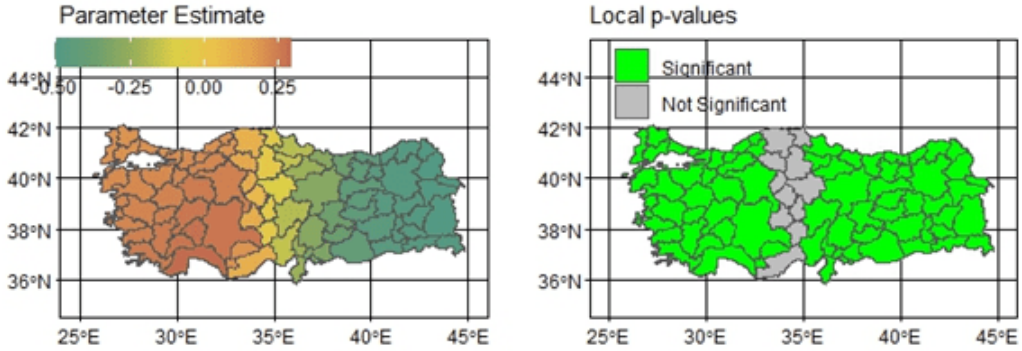

Figure 3: Employment Provided within the Scope of Incentives in Türkiye

ment increases per capita income by 0.25%. In the eastern provinces, including Adana, Kayseri, Sivas, Tokat, and Ordu, an increase in employment negatively affects income per capita. This result shows that the employment generated within the scope of incentives in the eastern provinces is not effective on the level of income per capita. In these provinces, the incentives provided should be organized to increase the employment capacity, which will contribute to increasing real economic activity and improving the efficiency of resource allocation in the long run.

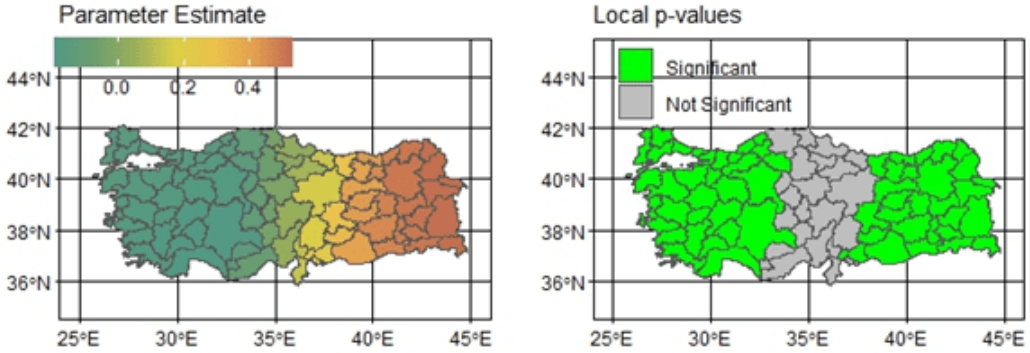

Figure 4: Number of Incentive Certificates in Türkiye

Figure 4 shows the relationship between incentive applications and province-level per capita income. The coefficient is significant in all provinces except for Kastamonu, Sinop, Samsun, Ordu, Çorum, Amasya, Tokat, Kırıkkale, Kırşehir, Yozgat, Sivas, Nevşehir, Kayseri, Niğde, Adana, Osmaniye, Karaman, Mersin and Hatay. In the provinces in the eastern part of Türkiye, a 1% increase in incentive applications is expected to lead to a 0.4% increase in per capita income. In the western provinces, on the other hand, a 1% increase in incentive applications is expected to lead to a low increase in per capita income. This result indicates that incentive applications reduce the development gap between eastern and western provinces.

Figure 5 shows the relationship between the level of exports by province and per capita income. Ankara is the only province where the coefficient is significant: a 1% increase in exports is expected to lead to a 0.04% increase in per capita income. In addition, the effect of exports on per capita income is higher in the western provinces than in the eastern provinces. However, the coefficient for these provinces is not significant.

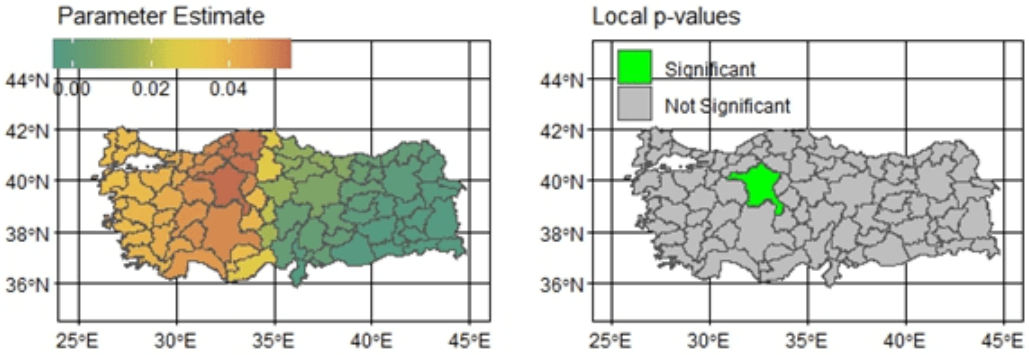

Figure 5: Total Exports in Türkiye

With the GWR method, it can be seen whether there is a province-level significance for the economic efficiency of investment incentives. These results show that geographical analysis methods should be considered when grouping provinces in incentive practices in Türkiye.

5 Conclusion

Incentives, unlike other public supports, have the advantages of directly contributing to the economy and achieving results in short periods of time. The fact that the effects of incentives can be observed more quickly enables them to be used in a wide range of areas (Akan & Arslan, 2008, p. 109). In Türkiye, especially since the planned development period, various public measures have been used to eliminate regional imbalances (Şahin & Uysal, 2011, p. 113). Following the general purpose of incentives, policies that will provide improvement and growth in the economy, increase employment, eliminate regional development differences and concentrate on industrial production are carried out.

In this study, the GWR method, which takes into account spatial effects, was used as an alternative proposal to the SEGE (Socio-Economic Development Index Research) classification provided in Figure A.1, which has been used in the distribution of incentives in

Türkiye and to contribute to the literature. The analysis results reveal that the investments within the scope of incentives, employment provided by incentives, the number of incentive documents and the effect of exports on national income vary by province. The provinces with the highest relationship between investments within the scope of incentives and national income were those in the geographically central part of Türkiye. This finding showed that investments within the scope of incentives had a positive effect in these provinces but did not affect the provinces in the eastern region as expected. Another result is that the provinces with the highest contribution of employment provided within the scope of incentives to national income are in different classes according to the SEGE classification. Of these provinces, Antalya and Ankara are in the first region; Konya, Bolu and Karabük are in the second region; and Bartın is in the fourth region. In the eastern regions, it was concluded that employment provided within the scope of incentives has no relationship with national income. Another result is that the relationship between incentive certificate applications and national income is higher in the eastern provinces. Finally, the province with the highest relationship between exports and national income is Ankara. These results provide scientific evidence that incentives are used in relatively underdeveloped regions, but economic efficiency cannot be achieved. Therefore, the effects of incentives on reducing regional development disparities are up for debate.

In line with our results, the following suggestions regarding investment incentives have been developed:

- Geographical (spatial) effects should be taken into account in the regional classifications of incentives. It is seen that the spatial effects of the provinces should also be taken into consideration in support of the SEGE classification used in the distribution of incentives in Türkiye. In addition, incentives should be made more effective by using current analysis techniques.
- Maintaining regional support for the eastern provinces to increase the income from incentivized investments is vital. In addition to incentives, creating a sustainable investment culture by providing support, e.g., education, to the region is required.
- The fact that employment does not sufficiently increase the income level can be explained by the low level of productivity and value-added created in production. The low productivity level of the investments made in these regions despite the incentives, the still high level of unemployment in the region, the insufficient number of unqualified and inexperienced labour, high production costs, and the increasing share of the unpaid family worker population from rural areas in the national income are the factors that cause the decrease in per capita income. For these reasons, measures such as increasing the number of qualified labour in employment and increasing the use of technology can be taken.
- It is seen that transportation and logistics conditions continue to be an essential cost element for manufacturing companies in Türkiye. This situation causes development imbalances between regions. To reduce this difference, creating alternative transportation and logistics opportunities in terms of energy and time will ensure more efficient use of incentives.
- The fact that exports display a significant relationship with income in Ankara can be regarded as the importance of the efficiency of corporate communication. This makes it easier for bureaucratic processes to be understandable and fast. Civil

society organizations such as TOBB, ATO and ASO are considered effective in this regard, especially in their dialogues with firms in Ankara. Proximity to the information center provides an advantage for Ankara companies. In this context, establishing the necessary communication with other provinces will bring about an increase in economic activities.

- Establishing a control mechanism within the scope of the implemented incentives emerges as an important issue. In other words, indicators such as investments realized, employment provided, and production levels should be physically controllable. To achieve this, institutionalization of the investments in question should be emphasized. In this way, the share of informality in investments will be reduced.

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Appendix

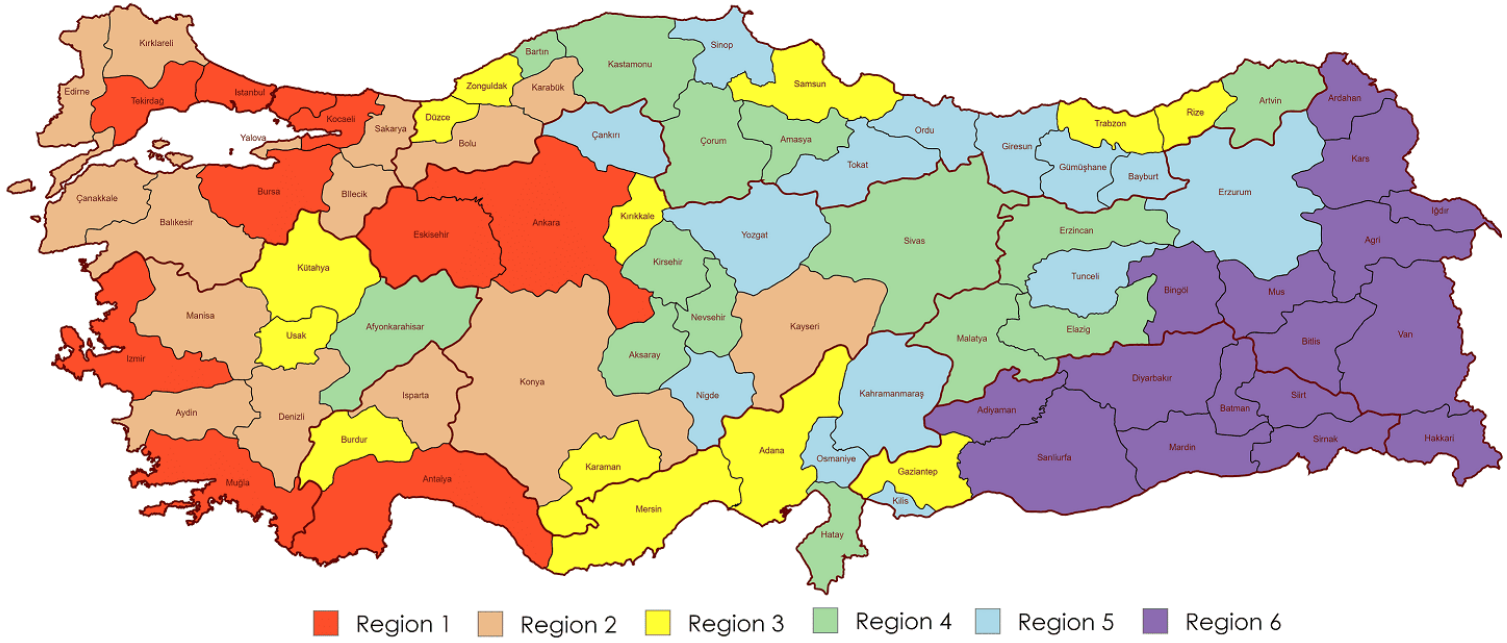

Figure A.1: Provinces in Türkiye According to Socio-Economic Development Classification
Source: Republic of Türkiye Ministry of Industry and Technology (2024)